

Social capital and cognitive decline in the aftermath of a natural disaster: a natural experiment from the 2011 Great East Japan Earthquake and Tsunami



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Summary

Background No previous studies have examined that social capital mitigates impacts of natural disaster experiences on cognitive function. We aimed to examine prospectively whether social capital mitigates the adverse effects of natural disaster on cognitive decline.

Methods In this natural experiment, the baseline for our study was established 7 months before the 2011 Great East Japan Earthquake and Tsunami in a survey of older community-dwelling adults who lived 80 km west of the epicentre (59.0% response rate). About 2 and a half years after the disaster, which occurred on March 11, 2011, the follow-up survey collected information about personal experiences of disaster as well as incidence of cognitive disability. Our primary outcome was cognitive disability (measured on an 8-level scale) assessed by in-home assessment.

Findings We obtained 5058 respondents at the baseline survey (59.0% response rate) and re-contacted 3594 survivors in the follow-up survey (82.1% follow-up rate). The experience of housing damage was associated with risk of cognitive impairment (coefficient 0.05 [95% CI 0.03 to 0.07]). Factor analysis of our analytical sample (n=3566) established two subscales of social capital: a cognitive dimension (perceptions of community social cohesion) and a structural dimension (informal socialising and social participation). Fixed effects regression indicated that improved informal socialising and social participation mitigated the risk of cognitive decline due to housing damage (coefficient -0.10 [95% CI -0.14 to -0.05]) and deteriorating informal socialising and social participation aggravated the effect of housing damage on cognitive decline (coefficient 0.04 [0.01 to 0.07]).

Interpretation Improved informal socialising and social participation reduces the risk of cognitive decline due to housing damage in the aftermath of natural disasters. Interventions to promote civic participation should be tried to promote cognitive resilience of older survivors.

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Introduction

In the aftermath of the 2011 Great East Japan Earthquake and Tsunami, which occurred on March 11, 2011, 89% of the post-disaster related deaths (3123 seniors of 3523 total deaths reported on Sept 30, 2016) were older residents who were 65 years old or older.¹ A particular concern for older survivors is the potential risk of cognitive decline. We have previously reported that experience of disaster—particularly housing damage—is associated with an increased risk of cognitive decline among older survivors.²

In turn, a wealth of epidemiological evidence suggests that the preservation of cognitive function in older individuals is dependent on their ability to maintain social connections in the community.³ To improve disaster resilience and protect the health of older adults, it is increasingly recognised that preserving social connections in the community—also referred to as social capital—serves as a crucial ingredient.^{4,5} According

to Aldrich (2012),⁶ communities endowed with higher stocks of social capital—ie, stronger bonds of trust between community members, as well as norms of mutual assistance—are better equipped to cope with the devastating consequences of disaster. However, no previous study has shown whether social capital mitigates the effect of disaster experiences on cognitive decline.

Social capital is often separated into cognitive and structural components. The former refers to how people perceive social relations in their community (eg, trust of others, mutual help, and community attachment), while the latter component captures what people actually do (eg, informal socialising with their neighbours and participation in social activities).⁷

We aimed to prospectively examine the association between changes in individual social capital and cognitive function, spanning the experience of disaster under a natural experiment.



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Research in context

Evidence before this study

We searched PubMed for manuscripts published in any language from database inception to Jan 24, 2017, using the following search terms: [("disaster"[Title/Abstract] OR "earthquake"[Title/Abstract]) AND ("social capital"[Title/Abstract]) AND ("Cognitive Disorders"[MeSH Major Topic] OR "dementia"[Title/Abstract])]. We specified "MeSH Major Topic" for "cognitive disorders" and searched in title or abstract for rest of words. As a result of the search using these inclusion criteria, we could not identify any articles. That is, to the best of our knowledge, no previous studies have examined whether social capital can buffer the effect of natural disaster experiences on cognitive function.

Added value of this study

Previous studies have shown that disaster experiences are linked to heightened risk of cognitive decline among affected

older individuals in the aftermath of the 2011 Great East Japan Earthquake as well as Hurricanes Katrina and Rita. Previous studies also suggested that social capital is protectively associated with depression and post-traumatic stress disorder following disasters. Our study extends the evidence that social capital buffers the effects of disaster experiences on cognitive decline. This study shows that informal socialising and social participation can buffer the adverse effect of housing damage on cognitive function among older survivors of natural disaster.

Implications of all the available evidence

Improved informal socialising and social participation reduces the risk of cognitive decline due to housing damage in the aftermath of natural disasters. Interventions to promote civic participation should be tried to promote cognitive resilience of older survivors.

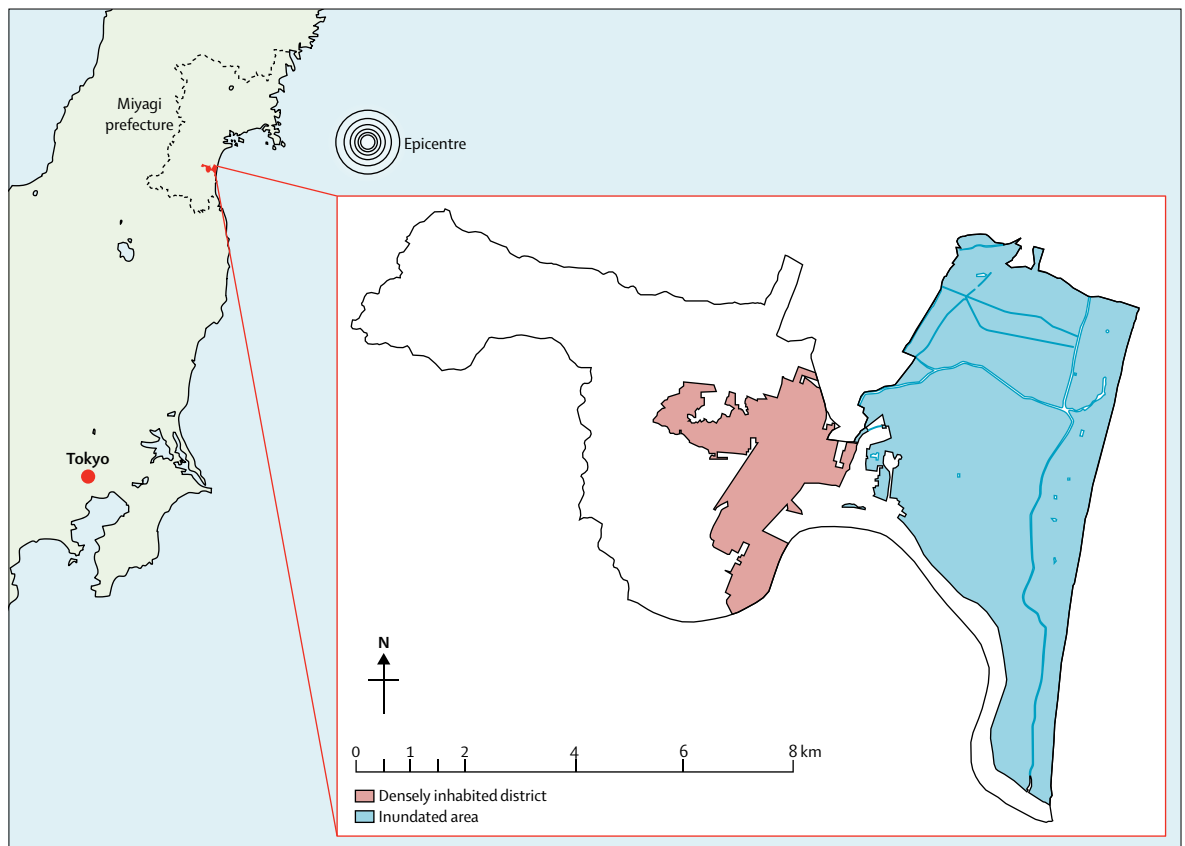


Figure 1: Map of inundated area in Iwanuma City, Japan

Methods

Study design and participants

In this study, we took advantage of a unique natural experiment in which information about social capital and cognitive function was collected in August, 2010, 7 months before the 2011 Great East Japan Earthquake and Tsunami, which occurred on March 11. The Japan

Gerontological Evaluation Study (JAGES) was established in 2010 as a nationwide sample of community dwelling residents aged 65 years or older. Our study area, Iwanuma city—located about 80 km west of the earthquake epicentre—was one of the field sites of the JAGES cohort. About 2·5 years after the disaster, we re-contacted the 3594 survivors aged 65 and older and

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